DOCUMENT RESUME

ED 431 423 IR 057 385

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TITLE	Making Project Groups Work II: The Impact of Group Process Training and Role Assignment on the Performance and Perception of Information Systems Project Teams.
PUB DATE	1998-12-00
NOTE	13p.; In: Proceedings of the International Academy for Information Management (IAIM) Annual Conference (13th, Helsinki, Finland, December 11-13, 1998); see IR 057 374.
PUB TYPE	Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Business Administration Education; Cooperative Learning; *Group Activities; Group Behavior; *Group Dynamics; Higher Education; Management Information Systems; Problems; *Role Perception; *Student Projects; Student Role; *Team Training; Teamwork
IDENTIFIERS	East Carolina University NC; *Group Cohesion; Role Delineation

ABSTRACT

Many project teams in organizations are highly structured, members have clearly defined roles, and they possess knowledge about how to effectively manage their projects and meetings. On the other hand, students in educational environments lack significant experience working in teams. Therefore, student teams are often poorly structured, members commonly have difficulty developing functional roles, and communication and coordination problems persist. The research described in this paper demonstrated the impact of these problems by interjecting two interventions in student project teams in a core business course on information systems at East Carolina University (North Carolina): training on group process and the role assignment. The results of a controlled experiment show that both interventions had positive impacts on student project teams. Team members that were assigned roles reported higher cohesion and produced higher quality projects than did team members in the control group. Furthermore, cohesion and project quality was highest in teams that received both training and role assignments. Findings and implications for future research are discussed. Figures present: dependent/independent variables; student roles; training session topics; sequence of data collection and course instructors; means/standard deviation scores for dependent measures; and trends in cohesion data for treatments/time periods. (Contains 28 references.) (Author/MES)

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ED 431 423

MAKING PROJECT GROUPS WORK II: THE IMPACT OF GROUP PROCESS TRAINING AND ROLE ASSIGNMENT ON THE PERFORMANCE AND PERCEPTION OF INFORMATION SYSTEMS PROJECT TEAMS

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Many project teams in organizations are highly structured, members have clearly defined roles, and they possess knowledge about how to effectively manage their projects and meetings. On the other hand, students in educational environments lack significant experience working in teams. Therefore student teams are often poorly structured, members commonly have difficulty developing functional roles, and communication and coordination problems persist. We demonstrated the impact of these problems by interjecting two interventions in student project teams: 1) training on group process and 2) the role assignment. The results of a controlled experiment show that both interventions had positive impacts on student project teams. Team members that were assigned roles reported higher cohesion and produced higher quality projects than did team members in the control group. Furthermore, cohesion and project quality was highest in teams that received both training and role assignments. A discussion of the findings and implications for future research are presented.

INTRODUCTION AND LITERATURE REVIEW

Project teams are increasingly being used as the fundamental organizational unit for managing information systems development projects as well as a variety of other types of projects (Busch, Hamalainen, Suh, Whinston, & Holsapple, 1991). Teams add value because they are flexible (e.g., the small size of a team enables its members to respond quickly), they are fluid (e.g., membership can be changed in response to internal and external pressures), and they are often more effective at managing large projects (e.g., by bringing together team members with a variety of skills appropriate for the project). Therefore, many educators have incorporated student project teams into a variety of courses (Butterfield & Bailey, 1996; Jones, 1996).

In spite of the importance of teams to organizations, our experience suggests that students often dislike participating in project teams. What is it about project teams that students dislike? Steiner (1972) and others (Larson, 1989; McKinney & Graham-Buxton, 1993; Sadler, 1994; & Yamane, 1996) have suggested that there are extra costs that are involved in working together in teams. For example, when completing a project alone, a student must only engage in whatever activities the project requires. In a simple sense, the activities, or work, required to complete the project is equivalent to the cost the student must pay to achieve success. However, working in a team adds costs to the process of completing the task. A significant part of these additional costs are related to the transaction costs involved in engaging in group work (Yamane, 1996).

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Transaction costs are those costs that arise because group members must spend time and energy communicating ideas and coordinating activities. There are many steps in the communication process where transaction costs can be compounded. For example, to communicate, a message must first be encoded by the speaker and then transmitted to the recipient(s). The recipient(s) of the message must be able to receive the message and then decode its meaning. Throughout this process, there are opportunities for the communication to be corrupted, misunderstood, or lost. When this occurs, misunderstanding will occur which will either lead to problems with coordination or to a need to communicate the message again. In either case, these types of communication problems lead to greater costs for the group members.

A second cause of transaction costs relates to the overhead associated with coordinating group activities. To carry out their activities, group members must schedule times for meeting interactions, allot time for these meetings, and communicate information about the agenda for meetings. In the context of student project teams, these activities involve the coordination of meeting times around student classes, extra-curricular activities, and work schedules. These coordination tasks, in particular, can be quite difficult for students to deal with because members of project groups are often assembled by the instructor in an ad hoc fashion or students self select their groups without considering their schedules or other potential conflicts.

Many of these problems are exacerbated by the fact that students lack experience with working on formal projects in structured group settings. For example, the average businessperson spends many hours per week in meetings (Panko, 1992). In general, these meetings are well structured, an agenda is set and published prior to the meeting, events and conversations occurring during the meeting are documented in the meeting minutes, and members of the meeting have defined roles. Furthermore, many people in organizational teams have significant experience with and, in some cases, training about topics such as meeting management, team processes, and conflict resolution.

Because most students do not have significant experience with meetings they are likely to have many more problems in their team meetings than would experienced members of organizational project teams. Therefore students often suffer from increased process losses associated with team coordination and role ambiguity. This raises a set of important issues for educators. For example, how can we provide students with guidance and interventions that will assist student teams in reducing transaction costs? In a study designed to examine this issue, Mennecke and Bradley (1997) introduced to their student teams an intervention consisting of role assignment. They found that members of student teams that were assigned roles had higher cohesion and produced higher quality projects than did members of teams without assigned roles. Thus, a very simple intervention was shown to help students improve their performance and their feelings about their teams. This raises the question, "What other interventions might help student project teams to function more effectively?"

One important issue for student teams is the lack of knowledge that many students have about issues like improving team processes, resolving conflict, and fostering beneficial leadership behaviors. Therefore it is possible that providing students with training on these issues would help them to function more effectively. To examine these issues, we performed a research experiment to identify whether student teams would benefit from two interventions: 1) role assignment and 2) training in group processes. Because knowledge about group processes was expected to be more beneficial to groups than role assignments alone, we expected that teams receiving this intervention would outperform all other groups. In addition, as shown by Mennecke and Bradley (1997), students receiving role assignments alone should also be expected to outperform student teams with no interventions.

The next section describes the methodology used in the study. This is followed by a description of our results. The paper concludes with a discussion of the findings and implications for teaching and further research.

RESEARCH METHODOLOGY

Independent and Dependent Variables

This research was designed to assess the impact of assigned roles and group process training on group performance and group member perceptions (Figure 1). It builds on the work of Mennecke and Bradley (1997) which sought to examine the impact of role assignment on team performance and attitudes. To extend this research, we manipulated not only role assignment but also training in group processes. There were three levels of intervention. The baseline level was identical to that described by Mennecke and Bradley (1997); that is, baseline groups were exposed to neither training nor to role assignment. The level 2 intervention consisted of role assignment. The roles were identical to those used by Mennecke and Bradley (1997); that is, group members

were assigned roles that were relevant to structuring their group interactions (Figure 2). The level 3 intervention consisted of both role assignment and training. In this treatment group members were not only assigned the roles used in the level 2 treatment, but they were also presented with six training sessions that dealt with a variety of topics related to planning meetings, promoting effective group processes, and resolving conflict (see Figure 3).

Several dependent variables were examined in the study (Figure 1). These variables can broadly be classified as either performance measures or perceptual measures. The primary performance measure is the students' project grades. The perceptual measures include group cohesion, member satisfaction with their interactions in the group, member ratings of leadership in the group, and member satisfaction with their group's performance. The *Attraction to Group* instrument designed by Evans and Jarvis (1986) was used to capture individual perceptions of group cohesion. The participation and satisfaction scales were adapted from Green and Taber's (1980) instrument. Several covariates were also examined. These include student demographic data, student GPA, and other information about the course. All perceptual measures and ratings were captured using questionnaires.

FIGURE 1
INDEPENDENT AND DEPENDENT VARIABLES

	Variable	Source
Treatment Levels		
Level 1	Baseline	No intervention
Level 2	Role Assignments	Group members assigned roles by instructor
Level 3	Training and Role Assignments	Group members assigned roles by instructor AND Group members presented with six training sessions that dealt with a variety of topics related to group processes
Dependent Variables	Group Cohesion	Questionnaire (beginning, middle, and end of semester)
	Group Member Satisfaction	Questionnaire (end of semester)
	Perceived Negative Social Behaviors	Questionnaire (end of semester)
	Project Grade	Assigned by Instructor
Covariates	Demographic Data (age, gender, experience with db software, etc.)	Questionnaire (beginning of semester)
	Student GPA	Questionnaire
	Instructor	Assigned

FIGURE 2
STUDENT ROLES

Role	Description of Responsibilities
Presider or Meeting Leader:	This person is responsible for keeping the group's meetings on task. This person should develop an agenda for the meeting and let other group members know the agenda. This person should monitor the group's progress during each meeting and identify where deviations from the agenda occur.
File Manager or Project Master	This person is responsible for making sure that the assignment/project files are secure, that backup copies are frequently made, and that all members have current copies of all assignments. Where necessary, this person is to coordinate the integration of different components of the database project. This person is to maintain frequent contact with other group members to make sure that they have current copies of all files.
Meeting Coordinator	This person is responsible for knowing the schedules for everyone on the team (a schedule should be turned in to this member immediately), deciding (based on these schedules) about the dates and times of team meetings, and notifying members of the scheduled meetings. This person has the authority to call a meeting as long as no conflicts exist with any member's *official* schedule.
Intermediary	This person is responsible for acting as the primary intermediary between the group and the course instructor. This person is to meet periodically with the instructor to discuss the progress of the group (this does not preclude other members from meeting with the instructor). This person should be aware of how the team is progressing on the project and whether there are any major conflicts between any members.

FIGURE 3
TRAINING SESSIONS FOR TREATMENT SECTIONS[1]

Training Session 1 — Goals for the First Few Meetings

Topics:
- A. Build relationships between team members
- B. Understand the roles that team members will play in the group meetings
- C. Identify the project goals for the team

Training Session 2 — Stages of Group Development

Topics:
- A. Forming
- B. Storming
- C. Norming
- D. Performing

Training Session 3 — Quality Leadership

Topics:
- A. Leaders focus on quality
- B. Leaders structure work
- C. Leaders facilitate discussion
- D. Leaders encourage cooperation and participation
- E. Look for opportunities to learn and improve

Training Session 4 — Issues in Decision Making

Topics:
- A. Symptoms of Groupthink and faulty group behavior
- B. Techniques to use to overcome faulty group behavior
  1. Brainstorming
  2. Multivoting
  3. Nominal Group Technique

FIGURE 3
(continued)

Training Session 5	Managing Conflict	
	Topics:	A. Competitive conflict
		B. Cooperative conflict
		C. Techniques for developing cooperative conflict
Training Session 6	Quality Improvement	
	Topics:	A. Techniques to improve quality
		B. Product improvements to improve quality

[1]The content for these training sessions was adapted from Scholtes, 1992

Subjects

Participants were recruited from eight sections of a core business course in information systems (DSCI 3063) taught at East Carolina University. In all cases treatment conditions were randomly assigned to course sections, therefore students did not have a choice about which treatment section they were in. However, all students were told that a research study was being conducted and that they were not required to participate in data collection nor to turn in questionnaires.

Experimental Procedures

The data reported in this paper was collected during two different semesters, spring 1997 and spring 1998. Three instructors (the three authors) taught the 8 sections of the course involved in the research with two of the authors teaching two sections of the course and one of the authors teaching four sections (see Figure 4). Data for the baseline condition and half of the data for the role assignment treatment were collected during the spring of 1997. Additional data for the role assignment treatment and all of the data for the training treatment were collected during the spring of 1998. Treatments were randomly assigned to the instructor and the sections.

FIGURE 4
SEQUENCE OF DATA COLLECTION AND COURSE INSTRUCTORS

	Instructor 1	Instructor 2	Instructor 3
Spring 1997	- 1 Level 1 Treatment Section	- 1 Level 1 Treatment Section	
	- 1 Level 2 Treatment Section	- 1 Level 2 Treatment Section	
Spring 1998		- 1 Level 2 Treatment Sections	- 2 Level 2 Treatment Sections
		- 1 Level 3 Treatment Section	- 2 Level 3 Treatment Section

In the sections receiving the level 3 treatment, the training was presented to students in six separate class sessions. These training sessions were presented to students approximately every other week during the last two-thirds of the semester. In the sections receiving role assignments (both the level 2 and level 3 treatments) the roles were presented to the student groups during one of the class sessions. During this session, the roles were explained

and students were asked to assume one of the roles during their work on the project. Students in each group were allowed to select which role they wanted to assume. Periodically during the semester students in these sections were reminded about the roles. Further, during the middle part of the semester, groups in all sections of the course were required to meet with the instructor to discuss their group, the course project, and to ask questions. Students that had been assigned roles were individually reminded of their roles during this meeting and encouraged to continue to engage in their role during the remainder of the semester.

Data was collected several times during the semester. For example, a demographic questionnaire was administered before groups were assigned and the course project introduced. This instrument asked for information such as the students' GPA, gender, experience using database software, and related information. Shortly after this, students were assigned to groups and roles were introduced to groups receiving this intervention. Approximately one week after groups were assigned, the group cohesion questionnaire was administered for the first time. Training was initiated approximately two weeks after groups were first formed and continued to be presented to students once every two weeks through the remainder of the semester. The cohesion questionnaire was administered again during the middle of the semester and also during the last week of the semester. In addition, students were asked to complete a questionnaire at the end of the semester that allowed them to evaluate the course, the instructor, and their group, plus this questionnaire allowed them to express their satisfaction with their project and their performance in the group.

The Course Project

The course is a common body course that is required for all business majors (School of Business majors include Accounting, Marketing, Finance, Management, Decision Sciences). One half of the course content is the development of an information system using Microsoft Access. The projects used in all sections of the course were selected by the researchers and involved fairly complex programming techniques. Although the projects used during the spring of 1997 and spring of 1998 differed in small ways (e.g., the "client" for the spring 1997 semester project was a campus group while the client for the spring 1998 semester project was a university administrator), the project requirements and level of difficulty were similar. Important components of the project were demonstrated to students in class sessions, but the students were responsible for applying these techniques in the development of their own information system. For most of the students, this resulted in a significant dependence on the other team members. Because of the scope and difficulty of the project, teams had to work well together to complete the project successfully.

RESULTS

The primary variables of interest in this study are student performance on their group's project, perceptions about cohesion, perceptions about satisfaction, and perceptions about their group. The means for the dependent variables are summarized in Table 1. The results of the analyses related to each of the variables are discussed below.

Control Variables

We examined a number of control variables to verify that extraneous factors such as the semester during which data were collected, the gender of the responder, the GPA of the responder, and the instructor did not have an impact on the results. The results indicate that there were no significant differences on age, gender, GPA, and database experience between the population of students during the spring 1997 and spring 1998 semesters and, for that matter, between any of the treatment conditions. Further, we examined the students' rating of their instructor's teaching quality as well as which instructor taught their section of the course. Neither of these variables were found to be significantly different across any of the treatment conditions nor significantly related to any of the dependent measures. Thus, we conclude that the population of students in each treatment and the quality of instruction in each section did not confound the results.

Cohesion

Our expectation was that group members in the role assignment treatment condition would develop more favorable perceptions of their group when compared to individuals in the baseline condition. In addition, we expected that group members in the training treatment condition would develop more favorable perceptions than all other groups. Cohesion was measured three times during the semester in order to examine the impact of the treatments on group member feelings about their group over time. The cohesion instrument was first delivered approximately one week after groups were formed (Time Period 1).

The instrument was again delivered during the seventh week after groups were formed (Time Period 2). The third

data collection occurred on either the last class meeting before the group projects were due or on the project due date -- approximately eleven weeks after groups were first formed (Time Period 3). The reliability scores for the cohesion scale are shown in Table 1.

To identify whether groups had similar perceptions about cohesion when they were first formed, we performed an ANOVA comparing cohesion scores across the treatment conditions for the first time period. The results show that, although marginal, groups did not have significantly different perceptions of cohesion shortly after they were formed ($F\{1,194\}=2.453$; $p=0.089$). Further, an analysis comparing respondents to the cohesion scale to non-respondents indicates that there is no significant difference between these groups in terms of age, gender, GPA, or experience with database software.

Because cohesion was captured repeatedly during the semester, this variable was examined using a repeated-measures multivariate analysis of variance (MANOVA). A repeated-measures MANOVA accounts for the dependence between the multiple observations of the dependent variable(s). Because a repeated measures MANOVA examines a variable over successive observations, responses were only used if an observation existed for all three of the time periods. The results of the MANOVA show that over time group members in both the treatment conditions reported significantly higher cohesion than did members of the control group ($F\{2,143\}=7.532$; $p=0.001$). A post hoc paired comparisons analysis (using LSD) demonstrates that at the second time period both the level 2 (role assignment alone; $p=0.001$) and level 3 (training plus role assignment; $p<0.001$) treatments had significantly higher cohesion than did the baseline groups. Further, the post hoc analysis also demonstrates that at the third time period groups in the level 3 treatment (training plus role assignment) not only had significantly higher cohesion than the baseline groups ($p=0.001$) but they also had marginally higher cohesion than did the groups in the level 2 treatment ($p=0.076$).

TABLE 1
MEANS AND STANDARD DEVIATION SCORES FOR DEPENDENT MEASURES

	Treatment Conditions		
	Level 1:	**Level 2**	**Level 3**
Dependent measures	Baseline	Role Assignment	Training and Role Assignment
Standardized Project Scores	n=46	n=112	n=60
Mean	84.7	88.1	90.1
Std Dev.	9.6	8.1	5.0
Cohesion[1] (larger = greater cohesion)	n=25	n=85	n=25
Time Period 1			
Mean	150.7	159.5	158.4
Std Dev.	18.5	18.1	15.0
Time Period 2			
Mean	143.0	156.5	159.7
Std Dev.	24.0	16.1	13.7
Time Period 3			
Mean	135.2	149.1	158.7
Std Dev.	31.6	29.3	16.9
Satisfaction with the Group's Process[2] (larger = lower satisfaction)	n=32	n=99	n=59
Mean	10.4	9.1	10.1
Std Dev.	5.2	4.6	4.5
Satisfaction with the Group's Project[3] (larger = higher satisfaction)	n=35	n=103	n=59
Mean	7.8	8.5	8.5
Std Dev.	1.6	1.8	1.8

TABLE 1
(continued)

Existence of Negative Social Behaviors[4] (larger = greater negative behavior)	n=36	n=103	n=59
Mean	5.8	4.8	5.1
Std Dev.	2.7	2.1	2.1

[1]The cohesion scale is composed of 20, 9-point items. Reliability: a=0.984
[2]The process satisfaction scale is composed of 5, 5-point items. Reliability: a=0.921
[3]The project satisfaction scale is composed of 2, 5-point items. Reliability: a=0.730
[4]The social behavior scale is composed of 4, 5-point items. Reliability: a=0.667

Further, the trend of the results show that cohesion in the level 1 and level 2 groups fell over time, but cohesion remained constant in the level 3 treatment condition (see Figure 5). Thus, both the role assignment and training appear to have had a positive impact on group member cohesion, but training plus role assignment provides marginally superior results.

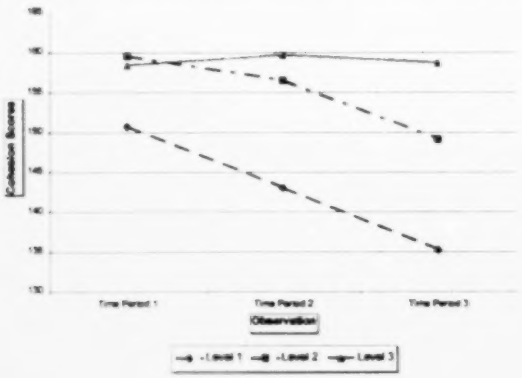
Other Perceptual Measures

Satisfaction with the group's meeting process, satisfaction with the group's project, and group member ratings of negative social behavior were all measured. Neither of the satisfaction measures were found to be significantly different across the treatment conditions. However, the results for expressed negative social behavior show that there is a marginally significant difference across the treatment conditions ($F\{2,197\}=2.930$; $p=0.056$). A post hoc paired comparison analysis (using LSD) demonstrates that groups in treatment level 2 (role assignment) exhibited significantly less negative social behavior than the groups in the baseline treatment ($p=0.017$). None of the other treatment levels showed a significant difference.

Performance

To examine the project scores, the scores within each section of the course were standardized to facilitate comparisons between different instructors and sections. For example, one instructor provided extra credit on the project while the other instructors did not. The results for the standardized project grades show that the groups in the two treatment conditions scored significantly higher on their projects than did groups in the control condition ($F\{2,217\}=6.360$, $p.=0.002$). These results indicate that the treatments had a significant positive impact on group performance. A post hoc analysis (using LSD) demonstrates that groups in treatment level 2 (role assignment) had significantly high project grades than the groups in the baseline condition ($p=0.014$). Furthermore, project scores for groups in the level 3 treatment were marginally higher than those for groups in the level 2 treatment ($p=0.104$).

FIGURE 5
TRENDS IN COHESION DATA FOR TREATMENTS AND TIME PERIODS



DISCUSSION

Many researchers have observed that groups change considerably as they develop over even short time periods (Carley, 1986; Hollingshead, McGrath, & O'Conner, 1993; McGrath, 1990). For example, the literature on group development indicates that interacting groups progress through various phases as they develop (Hollingshead et al., 1993; Mennecke, Hoffer, & Wynne, 1992; Poole, 1983; Poole & Doelger, 1986; Poole & Roth, 1989). Therefore, during the course of a typical semester, the dynamics within a team are likely to change considerably. During the early portion of the semester, the teams' tasks are comparatively simple and students will likely feel little stress associated with their group experiences. However, as the semester progresses, pressures associated with completing their project intensify at the same time that competition from other courses for a student's time and energies increases. As the due date for the project draws near, pressure increases and intra-group cohesion decreases as disagreements and conflicts arise related to completing the project. In addition to these problems, groups frequently have one or more members who are not as strongly motivated and curtail their participation in the group's activities (i.e., they free load).

This scenario is probably not uncommon for many student project teams. In one sense, this is a natural part of group life since conflict within groups is inevitable, particularly as external pressures increase. But does it have to be this way? Is there anything that can be done to help student project teams perform and interact more effectively? These are the questions we set out to answer in this research. Our expectation was that students who were knowledgeable about problems that groups typically face as well as techniques for addressing these problems would be better equipped to deal with these issues. Our results suggest that training project teams about group process does help them to outperform groups that did not receive this training. For example, while cohesion was lower at the end of the semester than at the beginning for the baseline groups and the groups that were assigned roles, the cohesion remained relatively constant for groups that also received training. Similarly, groups receiving training also had marginally higher project scores than did groups in the other treatments. Thus, training in group processes appears to have had a positive impact on group members' feelings about their group and their performance on their project.

The level 2 treatment, role assignments, also appears to have had an important positive impact on students' perceptions and performance. The roles that were assigned to the treatment groups were designed to help group members accomplish several core group functions. Often people working in groups have an innate awareness of the need to complete many of the functions represented by these roles. It is often very difficult, however, for individuals to take the lead by performing the functions represented by the roles. Furthermore, if only one or two group members perform these functions then they alone are burdened with the work required to complete these chores. If, on the other hand, roles are assigned to group members, then the work involved in completing the functions represented in each role is disseminated among the group members. Further, role assignment by the course instructor also sets expectations about appropriate behaviors and individual members are given authority to take action under the auspices of their role. In this way, many of the burdens that emergent leaders face are reduced.

Group performance, as measured by project scores, was also positively impacted by the treatments. Groups in the level 2 treatment had higher project grades than students in the baseline and groups in the level 3 treatment had higher project scores than all other groups. It is not clear from our results whether there is a direct cause and effect relationship between cohesion and performance or whether these variables might have a deeper relationship. However, prior research has shown that cohesion and performance are often related (Dorfman & Stephen, 1984; Evans & Dion, 1991; Greene, 1989; Keller, 1986; Wech et al. 1998). For example, Greene (1989) showed that cohesion and productivity had a reciprocal relationship; as productivity rose, cohesion also increased, which, in turn, would improve productivity. However, some evidence exists that in ongoing groups, cohesion has an antecedent relationship to performance and can be used to predict it. Apparently some groups that develop greater cohesion work better together and therefore produce better output (Dorfman & Stephen, 1984; Keller, 1986).

Why do these interventions help student teams? One explanation is that training on group processes and the assignment of roles can be seen to be specific interventions that provide groups with guidance on how to more effectively accomplish their projects. Therefore, the instructors provided students not only with information about group processes and the important roles and functions that needed to be incorporated into their groups, but also with a cue that helped these groups transition to a more effective work routine. For example, Gersick (1988, 1989) points out that it is difficult for groups to transition to new modes of work and to new group

structures without external cues. Furthermore, Gersick and Hackman (1990) indicate that this transition will not happen until the time is right for a change and there is a specific impetus to change. The impetus may include events such as a significant failure, reaching a milestone in the group's life cycle (e.g., "We only have one week left to complete this project!"), or the receipt of an external intervention (e.g., the instructor meeting with student teams to encourage them to work together or to resolve problems). In this case it appears that training and role assignment helped groups to more effectively transition to new, more effective work routines.

Since these interventions were not provided to groups in the control condition, these groups had to deal not only with the task-related issues (i.e., building their information system), but also with interpersonal issues related to managing conflict, deciding how to make decisions, identifying symptoms of faulty behavior, and identifying the role that each group member would assume in the group. This is in line with McGrath's Time, Interaction, and Process (TIP) Theory. McGrath (1991) suggests that groups develop differently depending on the difficulty of the task and problem solving context. TIP theory proposes that groups typically engage in three simultaneous functions: a member support function, a group well-being function, and a production function. Therefore, when group members process a task, they do more than just work on the task, they weave into the task those behaviors that are designed to support members and foster the well being of the group. He suggests that groups facing a simple problem or one that they are familiar with will be able to move directly from early stages of their group's development to stages where they can focus on task completion. On the other hand, groups that encounter a highly complex task or a task that they are unfamiliar with will need to engage in a number of social and interpersonal behaviors required to make the group functional. From this perspective it can be seen that the interventions we provided to our student teams helped them to better deal with the member support and group well-being functions. In this context, it is no wonder that cohesion within the baseline groups would be significantly lower at the close of the semester when compared to the two treatment groups.

The assignment of roles and responsibilities in a group is one of the factors regularly found in business environments. If I attend a faculty meeting, for example, I generally know what my role is and what I need to do to help the group function well during the meeting. Yet, in many courses the common practice of most instructors is to put groups together and then turn them loose to perform their assigned tasks. Our results suggest that instructors should do more to provide guidance for their groups. They should clarify the tasks that are critical to the functioning of the group, alert students to potential problems their groups may encounter, show them how to resolve conflict, tell them about group processes, and define roles for students.

FUTURE RESEARCH

The results of this study indicate that interventions into student project teams have a demonstrably favorable impact on performance and perceptions. These results also suggest several possibilities for future research into this and related pedagogical issues. For example, this research was carried out in a course involving a semester-long project that was very demanding and time consuming. A question that has yet to be resolved concerns whether this type of intervention will be needed for shorter term and/or less intense projects. For example, less intense projects would likely not carry transaction costs that are as high. In these instances, groups may be able evolve adequate group structures themselves without external interventions.

In addition, future research should investigate other interventions that might help groups function more effectively. For example, collaborative technologies such as group support systems, chat rooms, email, and similar groupware tools should help groups to better coordinate their activities. One of the problems students encounter when working in teams is the diversity and conflict present in the group members' schedules. Collaborative tools should allow team members to conduct virtual meetings and thereby overcome some of these scheduling conflicts.

LIMITATIONS

Generalizations of the findings from this research are limited by the methodologies used to construct the experimental manipulations and collect the data. For example, the three instructors teaching the eight sections of the course were knowledgeable about the nature of the research and the expected results. To control for this, every attempt was made to standardize the construction and delivery of the manipulations and the course content. For example, the instructors coordinated the content and delivery of syllabi, texts, assignments, exams, and instructions. The fact that the instructor teaching the student's class was not found to be a significant covariant supports the view that these precautions helped to control for the differences in instruction. Nevertheless, the

variations that existed in each class because of the differences in teaching philosophies and techniques applied by each instructor should be considered in interpreting these results.

Finally, it should be recognized that the respondents to the questionnaires represent only a sample of the students that were enrolled in the course. We could not force students to complete questionnaires, therefore many elected to withhold their responses. It is possible that respondents are not representative of the class as a whole. Nevertheless, an analysis of the demographic data comparing respondents to the cohesion questionnaire to non-respondents showed that they were not significantly different in terms of age, GPA, and other vital data. Therefore, our findings are likely representative of the population of students in the course and of most business students.

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